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BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER	
BUEKER, RICHARD R	
ART UNIT	PAPER NUMBER
1792	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/672,013	AHN ET AL.	
	Examiner	Art Unit	
	Richard Bueker	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6 and 8-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6 and 8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/19/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Applicants should correct the typographical error in claim 11, line 24, by changing "fist" to "first".

Claims 11-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 11, lines 5-8, the phrase "transferring the first organic source vapors by a transfer gas supplied from a transfer gas supply source, via a transfer gas transfer line and an organic source vapor transfer line, to a shower head of a process chamber" is unclear, because the phrase "via a transfer gas transfer line and an organic source vapor transfer line" appears to refer back to "transferring the first organic source vapors", but applicants' accompanying comments on page 6 of their response seem to indicate that this phrase is intended to refer back to "a transfer gas supplied from a transfer gas supply source". It is noted also that applicants' comments on page 6 of the response include the statement that "to improve clarity, applicants amend claim 11 to more clearly point out that both of the transfer gas transfer line and the source vapor transfer line carry the source vapor". It is noted, however, that while these comments use the phrases "source vapor transfer line" and "source vapor", the claims recite "organic source vapor transfer line" and "first organic source vapors" (emphasis added). Applicants' comments on page 6 further include "(i)n the specification at paragraph 52 and Fig. 2, an embodiment is described and shown that the transfer gas is carried by a transfer gas transfer line 417 and a source vapor transfer line 350 from a transfer gas supply source 410 to a shower head 110". First it is noted that applicants' specification as filed does not include paragraph numbering, and exactly

which paragraph applicants are referring to as paragraph 52 cannot be determined. Therefore, applicants should identify the portion of their specification that they are referring to by page and line numbers. Secondly, it is noted that the above two quotes from applicants' comments appear to be contradictory, and it appears that applicants are using the phrase “source vapor” to refer to the claimed “transfer gas”. In their next response, applicants are requested to clearly state whether or not they are intentionally using the phrase “source vapor” to mean “transfer gas”.

Claims 1, 4, 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa (6,277,201) taken in view of Randive (6,789,789) and/or Ono (JP 2001-011634) and optionally taken in further view of Simhan (3,888,649) and optionally taken in further view of Jurgensen (2003/0054099) and Kirlin (5,536,323).

Nishikawa (see Fig. 1, for example) discloses an apparatus for vapor phase deposition including a process chamber, a temperature controlled substrate holder, a showerhead, a source chamber for generating organic source vapors, and a diluted gas supply (see line L5 of Fig. 1, col. 2, lines 50-54, col. 4, lines 7-20 and col. 5, lines 58-63). The source chamber of Nishikawa doesn’t include a conic block or conic plate transfer gas distributor of the type now claimed. Each of Randive (see Fig. 4, for example) and Ono (see Figs. 1-6, for example), however, discloses an alternative type of vaporizer for vaporizing an organo-metallic CVD precursor liquid, wherein the vaporizer source chamber includes a transfer gas distributor in the form of “a conic block or conic plate with an apex aligned with a transfer gas inlet and pointing towards the transfer gas inlet and is formed such that the transfer gas cannot be transmitted

therethrough in order to distribute widely along an outer inclined plane of the conic block or conic plate the transfer gas from the transfer gas inlet" as now recited in claim 1. It would have been prima facie obvious to one skilled in the art to modify the apparatus of Nishikawa by replacing Niskikawa's vaporizer with a functionally equivalent vaporizer of the type described by Randive or Ono, as the results of such a substitution would be no more than expected by one skilled in the art.

Regarding limitations of (1) the transfer gas inlet being formed by a first plurality of holes, and (2) the source vapor outlet formed by a second plurality of holes, it is noted that in Randive's apparatus (see Fig. 4), the porous plate 74 is a transfer gas inlet as claimed and it is formed of a first plurality of holes for allowing transfer gas to enter the source chamber for distribution by the transfer gas distributor. Also, the source vapor outlet includes a plurality of gaps 90 as described at col. 5, lines 51-55 of Randive. The dictionary definition of "hole" includes "gap", and the plurality of gaps 90 of Randive are a plurality of holes that form the source vapor outlet. Also, Simhan (see Fig. 1, elements 34 and 35) is cited as an alternative example of using a plurality of holes to form a source vapor outlet under a splash cone. It would have been obvious to form the source vapor outlet that supports the splash guard of Randive as a plurality of round holes in the manner taught by Simhan, because Simhan teaches that such a vapor outlet having round holes can successfully be used for the desired purpose of Randive. Also, regarding Ono, Ono (see Figs. 3 and 4 and paragraph 45) teaches that his transfer gas inlet is formed of many carrier gas blow holes 8. Also, it would have been obvious to modify the source vapor outlet of Ono by providing it with gap holes as

taught by Randive, or round holes as taught by Simhan, because each of Randive and Simhan teach that a plurality of holes provided in a source vapor outlet will successfully perform the desired function of Ono of removing source gas from a vaporizing chamber.

Regarding the newly added limitation of "maintaining the organic source vapor line at a constant temperature to prevent condensation of the first organic source vapors, the organic source vapor transfer line being kept at a temperature lower than the temperature of the source chamber", it is first noted that the particular temperature used is a process limitation and does not so limit the present apparatus claims. The apparatus of the cited references is inherently capable of being used according to the added temperature process limitations. With respect to the method claims, it is noted that it was held in *Ex parte Khusid et al.*, 174USPQ59, that where the principal difference between a claimed process and that taught by a reference is a temperature difference, it is incumbent upon applicants to establish criticality of that difference. In the present case, applicants' claims and specification describe a transfer line temperature lower than a source chamber temperature without ever explaining why it should be lower, and therefore this temperature limitation is considered prima facie obvious in accordance with *Ex parte Khusid et al*. Thirdly, both Jurgensen (see paragraph 73) and Kirlin (see Figs. 1 and 2, col. 6, lines 19-30, and the paragraph bridging cols. 7 and 8) teach the step of maintaining the temperature of an organic source vapor transfer line at a temperature lower than the temperature of a vapor source chamber, and in view of these teachings it would have been obvious to do so in the apparatus of Nishikawa, Randive and/ Ono. Regarding the recited limitation of "the

organic source vapor transfer line is maintained at a constant temperature to prevent condensation" Jurgensen (paragraph 73) teaches that the purpose of heating the vapor transfer line is to prevent condensation, and the steady-state operation of any of the cited prior art processes mains the temperature of the vapor transfer line at a constant steady-state temperature.

Regarding claim 6, the source heater of each of Randive and Ono also surrounds the organic source vapor outlet. Regarding claim 9, Nishikawa's apparatus includes a plurality of transfer lines and valves connected to line L5 as recited in claim 9.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa (6,277,201) taken in view of Randive (6,789,789) and/or Ono (JP 2001-011634) and optionally in further view of Simhan (3,888,649) and optionally taken in further view of Jurgensen (2003/0054099) and Kirlin (5,536,323) for the reasons discussed above, and taken in further view of Ohashi (6,059,885) (see Figs. 2-10, and col. 14, lines 59-60, for example) or Nguyen (6,444,039) (see Figs. 2 and 6 and col. 2, lines 8-15, for example), each of whom teaches the use of a shower curtain installed between a shower head and a substrate holder in a vapor deposition apparatus, wherein the shower curtain surrounds the substrate holder to improve the gas flow or protect the process chamber walls, and for those reasons it would have been obvious to use such a shower curtain in the vapor deposition apparatus of Nishikawa.

Claims 6, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa (6,277,201) taken in view of Randive (6,789,789) and/or Ono (JP 2001-

011634) and optionally taken in further view of Simhan (3,888,649) and optionally taken in further view of Jurgensen (2003/0054099) and Kirlin (5,536,323) for the reasons stated above, and taken in further view of Van Buskirk (5,882,416). Van Buskirk (see Figs. 1 and 6 and col. 10, lines 25-62, particularly lines 58-62) teaches that a source vapor transfer line that transfers source vapor from a vaporizer to a CVD chamber should be kept at a constant temperature to prevent condensation. It would have been obvious to one skilled in the art to maintain the source vapor transfer line L3 of Nishikawa at a constant temperature because Van Buskirk teaches that it is desirable to do so. Regarding the step of purging recited in claim11, it is noted that Nishikawa (see Fig. 1 and col. 6, lines 5-9) teaches the step of purging a CVD chamber after a thin film formation process has been completed.

Claims 1, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell (6,461,436) taken in view of Gordon (6,969,539) and in further view of Randive (6,789,789) and/or Ono (JP 2001-011634) and optionally in further view of Simhan (3,888,649) and optionally taken in further view of Jurgensen (2003/0054099) and Kirlin (5,536,323), and in further view of Chiang (6,630,201) or Aro (WO 01/40541). Campbell discloses an atomic layer deposition (ALD) apparatus and method. ALD is a type of vapor phase deposition that can use an organo-metallic coating material, and therefore ALD can be “a method using organic vapor phase deposition” as presently claimed. The apparatus of Campbell (see Fig. 4, for example) includes a process chamber 10, a substrate holder and temperature controller 13, a showerhead 18, a plurality of transfer lines 6, 9,26 and 36 which are installed to allow

different organic vapors to sequentially enter the process chamber or bypass the chamber using "time-division", and a plurality of valves 4 and 8, as presently claimed. Campbell doesn't discuss specific organo-metallic compounds used in his apparatus, or the types of vaporizers used to supply the compounds. Gordon (see Fig. 1, for example) also discloses ALD processes and apparatus, and he teaches the use of plural organo-metallic compounds as source materials to be vaporized for use in an ALD process. Gordon also teaches (see col. 20, lines 13-33, for example) that any conventional vaporizer can be used to vaporize the liquid organo-metallic compounds in order to provide plural flows of vapor to be supplied to the ALD process chamber. Gordon specifically suggests vaporizers such as thin film evaporators or direct liquid injection vaporizers, which are the type of vaporizers that are described by Randive and Ono. It would have been obvious to one skilled in the art to use two organo-metallic source vaporizers of the type taught by Randive or Ono as the ALD material sources in the apparatus of Campbell, because Gordon teaches that it is desirable to use two organo-metallic source materials for ALD, and because Gordon specifically teaches that vaporizers of the type taught by Randive, Takamatsu or Ono can successfully be used for ALD. Gordon (see Fig. 1 and the paragraph bridging cols. 21 and 22) also teaches that a vapor transfer line should be kept at a constant temperature to prevent condensation, as recited in claim 11. Also, Chiang and Aro are cited in the rejection for their more detailed explanation of the ALD process. Chiang (see Figs. 21, 22, 35(a)-35(d), 39(a) and 39(b), for example) and Aro (see page 2, lines 15-33) explain that an ALD process inherently includes a step of forming an organic containing thin film on the

substrate by chemisorption, and this step is inherent in any ALD process using organo-metallic compounds. Simhan is optionally cited for the same reasons as discussed in the first prior art rejection above.

Regarding the newly added limitation of "maintaining the organic source vapor line at a constant temperature to prevent condensation of the first organic source vapors, the organic source vapor transfer line being kept at a temperature lower than the temperature of the source chamber", it is first noted that the particular temperature used is a process limitation and does not so limit the present apparatus claims. The apparatus of the cited references is inherently capable of being used according to the added temperature process limitations. With respect to the method claims, it is noted that it was held in *Ex parte Khusid et al.*, 174USPQ59, that where the principal difference between a claimed process and that taught by a reference is a temperature difference, it is incumbent upon applicants to establish criticality of that difference. In the present case, applicants' claims and specification describe a transfer line temperature lower than a source chamber temperature without ever explaining why it should be lower, and therefore this temperature limitation is considered prima facie obvious in accordance with *Ex parte Khusid et al*. Thirdly, both Jurgensen (see paragraph 73) and Kirlin (see Figs. 1 and 2, col. 6, lines 19-30, and the paragraph bridging cols. 7 and 8) teach the step of maintaining the temperature of an organic source vapor transfer line at a temperature lower than the temperature of a vapor source chamber, and in view of these teachings it would have been obvious to do so in the apparatus of Campbell, Gordon (6,969,539), Randive (6,789,789) and Ono.

Regarding the recited limitation of "the organic source vapor transfer line is maintained at a constant temperature to prevent condensation" Jurgensen (paragraph 73) teaches that the purpose of heating the vapor transfer line is to prevent condensation, and the steady-state operation of any of the cited prior art processes mains the temperature of the vapor transfer line at a constant steady-state temperature.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell (6,461,436) taken in view of Gordon (6,969,539) and in further view of Randive (6,789,789) and/or Ono (JP 2001-011634) and optionally in further view of Simhan (3,888,649), and optionally taken in further view of Jurgensen (2003/0054099) and Kirlin (5,536,323), and in further view of Chiang (6,630,201) or Aro (WO 01/40541) for the reasons stated it the previous paragraph rejection, and taken in further view of Van Buskirk (5,882,416). Van Buskirk (see Figs. 1 and 6 and col. 10, lines 25-62, particularly lines 58-62) teaches that a source vapor transfer line that transfers source vapor from a vaporizer to a CVD chamber should be kept at a constant temperature to prevent condensation. Van Buskirk also teaches that a bypass vent line (line 134 of Fig. 1) should be kept at a constant temperature to prevent condensation. It would have been obvious to one skilled in the art to maintain the source vapor transfer lines of Campbell, including the bypass vent lines 26 and 36, at a constant temperature because Van Buskirk teaches that it is desirable to do so.

Applicants have argued that the none of the cited prior art references teach the newly claimed limitations of "maintaining the organic source vapor line at a constant temperature to prevent condensation of the first organic source vapors, the organic

source vapor transfer line being kept at a temperature lower than the temperature of the source chamber", it is first noted that the particular temperature used is a process limitation and does not so limit the present apparatus claims. The apparatus of the cited references is inherently capable of being used according to the added temperature process limitations. With respect to the method claims, it is noted that it was held in *Ex parte Khusid et al.*, 174USPQ59, that where the principal difference between a claimed process and that taught by a reference is a temperature difference, it is incumbent upon applicants to establish criticality of that difference. In the present case, applicants' claims and specification describe a transfer line temperature lower than a source chamber temperature without ever explaining why it should be lower, and therefore this temperature limitation is considered prima facie obvious in accordance with *Ex parte Khusid et al.* Thirdly, both Jurgensen (see paragraph 73) and Kirlin (see Figs. 1 and 2, col. 6, lines 19-30, and the paragraph bridging cols. 7 and 8) teach the step of maintaining the temperature of an organic source vapor transfer line at a temperature lower than the temperature of a vapor source chamber, and in view of these teachings it would have been obvious to do so in the apparatus of the primary references. Regarding the recited limitation of "the organic source vapor transfer line is maintained at a constant temperature to prevent condensation" Jurgensen (paragraph 73) teaches that the purpose of heating the vapor transfer line is to prevent condensation, and the steady-state operation of any of the cited prior art processes mains the temperature of the vapor transfer line at a constant steady-state temperature.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Richard Bueker/
Primary Examiner, Art Unit 1792